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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,299	12/31/2003	John Colgrove	5760-15100	9804

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P.O. Box 398
Austin, TX 78767

EXAMINER

LO, KENNETH M

ART UNIT	PAPER NUMBER
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2188

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<p align="center">Office Action Summary</p>	<p>Application No.</p> <p>10/749,299</p>	<p>Applicant(s)</p> <p>COLGROVE ET AL.</p>	
	<p>Examiner</p> <p>Kenneth M. Lo</p>	<p>Art Unit</p> <p>2188</p>	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/26/2004 4/11/2005 3/01/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The instant application having Application No. 10/749299 has a total of 42 claims pending in the application; all of which are ready for examination by the examiner.

Oath/Declaration

1. The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in **37 C.F.R. 1.63**.

Drawings

2. The applicant's drawings are submitted is acceptable for examination purposes.

Information Disclosure Statement

3. As required by **M.P.E.P 609(C)**, the applicant's submissions of the Information Disclosure Statements dated 05/26/2004, 04/11/2005 and 03/01/2006 is acknowledged by the examiner and the cited reference have been considered in the examination of the claims now pending. As required by **M.P.E.P 609 C(2)**, a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

Specification

4. The applicant's specification submitted is acceptable for examination purposes.

REJECTIONS NOT BASED ON PRIOR ART

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 5, 25, and 36 recite the limitation "the storage class". There is insufficient antecedent basis for this limitation in the claim. "The storage class" could refer to either the not modifiable class or the modifiable class. Examiner recommends, if deemed so appropriate by Applicant in accordance to their invention and disclosure, this be changed to "the one or more other storage classes".

7. Claims 7, 18, 27, and 38 recite the limitation "the write-locked storage class". There is insufficient antecedent basis for this limitation in the claim.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-5, 8-16, 19-25, 28-36, 39-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Kishi (United States Patent 6,029,179).

As per Claim 1, 14, 19, 21, and 32, Kishi discloses, “a processor” as [“a computer 210 comprised of a microprocessor” (Col 7, Lines 36-37)] “and a memory comprising program instructions, wherein the program instructions are executable by the processor to implement” [Kishi discloses this limitation as “a memory, the medium tangibly embodying one or more programs of instructions executable by the computer” (Claim 24)] “file system software configured to assign and migrate data in a multi-class file system comprising a hierarchy of storage classes” [Kishi discloses this limitation as “In hierarchical storage systems, intensively used and frequently accessed data is stored in fast but expensive memory. In contrast, less frequently accessed data is stored in less expensive but slower memory.” (Col 1, Lines 11-15)] “wherein one or more of the storage classes store data that is not modifiable by applications while the data is on the one or more storage classes” [Kishi discloses this limitation as “the suspect physical tape volume is deemed “read-only” by the storage manager.” (Col 1, Lines 56-57)] “an application configured to perform an operation that requires stable data, wherein, to perform the operation on the one or more storage classes that store data that is not modifiable by applications while the data is on those storage classes, the application is configured to perform the operation without using a split mirror of the one or more storage classes” [Kishi discloses this limitation as “The first step in read-only processing performed by the automated administrator 36 is to query the storage manager 30 for a list of all the logical volumes or files that the storage manager 30 has written to the physical volume at step 42.” (Col 5, Lines 19-22)]. As per Claim 14, Kishi discloses,

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“a host system configured to couple to the plurality of storage devices via a network” as [“The virtual tape system (VTS) 22 may be in communication with a host computer 24 via a host-to-data interface 26. The host-to-data interface 26, such as IBM's Enterprise Systems Connection (ESCON), may be a fiber optic local area network used to link mainframes to disk drives or other mainframes.” (Col 4, Lines 22-27)].

As per Claim 2, 15, 22, and 33, Kishi discloses, “wherein the operation is a backup of the storage classes” as [“the logical volume is reported as being completely or partially on the read-only physical volume, the automated administrator 36 may issue a recall to make the storage manager 30 read the data from the read-only physical volume to the VTS DASD at step 58 and copy the volume onto the DASD. If the file is recalled successfully, the automated administrator 36 makes the file appear to be updated to the storage manager 30, and gives it a new unique external object identification at step 60, after which the storage manager 30 will assume the most recent version of the logical volume is the one on DASD, and is not on a physical tape. A message is placed on an internal administrator message queue, queuing this logical volume for migration by an administrator asynchronously running file migration thread at step 62.” (Col 5, Line 62 – Col 6, Line 9)].

As per Claim 3, 23, and 34, Kishi discloses, “wherein, to perform the operation on one or more others of the hierarchy of storage classes, the application is further configured to perform the operation using a split mirror of the one or more other storage

classes” as [**“Another data protection scheme maintains a redundant set of the logical volumes that are stored on each tape. Each time a volume is written from the DASD to a tape device, a second copy of the volume could be mirrored on another tape. Then, if one tape device becomes unreliable, the storage manager may determine a list of volumes that were on the unreliable tape device, and then determine the location of the mirror copy corresponding to each of the volumes on the unreliable tape.”** (Col 2, Lines 20-29)].

As per Claim 4, 24, and 35, Kishi discloses, “wherein the one or more other storage classes store data that is modifiable by the applications while the data is on those storage classes” as [**“When the host writes a logical volume, or a file, to the VTS, the data is stored as a file on the DASD. Although the DASD provides quick access to this data, it will eventually reach full capacity”** (Col 1, Lines 22-25)].

As per Claim 5, 25, and 36, Kishi discloses, “wherein the operation is a backup of the storage classes” as [**“Another data protection scheme maintains a redundant set of the logical volumes that are stored on each tape. Each time a volume is written from the DASD to a tape device, a second copy of the volume could be mirrored on another tape. Then, if one tape device becomes unreliable, the storage manager may determine a list of volumes that were on the unreliable tape device, and then determine the location of the mirror copy corresponding to each of the volumes on the unreliable tape.”** (Col 2, Lines 20-29)].

As per Claim 8, 28, and 39, Kishi discloses, “wherein the data includes files or portions of files” as [**“Another approach to prevent the loss of data from an**

unreliable tape is using backup systems.... In a full backup, all files of the disk are copied to tape.” (Col 2, Lines 4-8)].

As per Claim 9, 29, and 40, Kishi discloses, “wherein the data comprises one or more of application data and file system metadata” as [“the logical volume data for a selected logical volume, typically the oldest, is removed from the DASD to free space for more logical volumes.” (Col 1, Lines 29-32)].

As per Claim 10, 30, and 41, Kishi discloses, “wherein the storage classes are ordered in the hierarchy according to one or more characteristics from a highest storage class to a lowest storage class” as [“In hierarchical storage systems, intensively used and frequently accessed data is stored in fast but expensive memory. One example of a fast memory is a direct access storage device (DASD). In contrast, less frequently accessed data is stored in less expensive but slower memory. Examples of slower memory are tape drives and disk drive arrays. The goal of the hierarchy is to obtain moderately priced, high-capacity storage while maintaining high-speed access to the stored information.” (Col 1, Lines 9-19)].

As per Claim 11, Kishi discloses, “wherein the one or more characteristics include one or more of performance and cost” [“In hierarchical storage systems, intensively used and frequently accessed data is stored in fast but expensive memory. One example of a fast memory is a direct access storage device (DASD). In contrast, less frequently accessed data is stored in less expensive but slower memory. Examples of slower memory are tape drives and disk drive arrays. The

goal of the hierarchy is to obtain moderately priced, high-capacity storage while maintaining high-speed access to the stored information.” (Col 1, Lines 9-19)].

As per Claim 12, 31, and 42, Kishi discloses, “wherein the storage classes are ordered in the hierarchy of storage classes according to performance characteristics from a highest storage class comprising one or more high-performance storage devices to a lowest” as [“In hierarchical storage systems, intensively used and frequently accessed data is stored in fast but expensive memory. One example of a fast memory is a direct access storage device (DASD). In contrast, less frequently accessed data is stored in less expensive but slower memory. Examples of slower memory are tape drives and disk drive arrays. The goal of the hierarchy is to obtain moderately priced, high-capacity storage while maintaining high-speed access to the stored information.” (Col 1, Lines 9-19)].

As per Claim 13, Kishi discloses, “a processor” as [“a computer 210 comprised of a microprocessor” (Col 7, Lines 36-37)] “a memory comprising program instructions, wherein the program instructions are executable by the processor to implement” [Kishi discloses this limitation as “a memory, the medium tangibly embodying one or more programs of instructions executable by the computer” (Claim 24)] “file system software configured to assign and migrate data in a multi-class file system comprising a hierarchy of storage classes” [Kishi discloses this limitation as “In hierarchical storage systems, intensively used and frequently accessed data is stored in fast but expensive memory. In contrast, less frequently accessed data is stored in less expensive but slower memory.” (Col 1, Lines 11-15)] “an

application configured to perform an operation on the storage classes that requires stable data, wherein, to perform the operation, the application is configured to: perform the operation on at least one of the storage classes without using a split mirror” **[Kishi discloses this limitation as “The first step in read-only processing performed by the automated administrator 36 is to query the storage manager 30 for a list of all the logical volumes or files that the storage manager 30 has written to the physical volume at step 42.” (Col 5, Lines 19-22)]** “perform the operation on at least one other of the storage classes using a split mirror.” **[Kishi discloses this limitation as “Another data protection scheme maintains a redundant set of the logical volumes that are stored on each tape. Each time a volume is written from the DASD to a tape device, a second copy of the volume could be mirrored on another tape. Then, if one tape device becomes unreliable, the storage manager may determine a list of volumes that were on the unreliable tape device, and then determine the location of the mirror copy corresponding to each of the volumes on the unreliable tape.” (Col 2, Lines 20-29)].**

As per Claim 16, Kishi discloses, “wherein, to perform the operation on one or more others of the hierarchy of storage classes, the application is further configured to perform the operation using a split mirror of the one or more other storage classes” as **[“Another data protection scheme maintains a redundant set of the logical volumes that are stored on each tape. Each time a volume is written from the DASD to a tape device, a second copy of the volume could be mirrored on another tape. Then, if one tape device becomes unreliable, the storage manager**

may determine a list of volumes that were on the unreliable tape device, and then determine the location of the mirror copy corresponding to each of the volumes on the unreliable tape.” (Col 2, Lines 20-29)] “wherein the one or more other storage classes store data that is modifiable by the applications while the data is on those storage classes” [Kishi discloses this limitation as “When the host writes a logical volume, or a file, to the VTS, the data is stored as a file on the DASD. Although the DASD provides quick access to this data, it will eventually reach full capacity” (Col 1, Lines 22-25)].

As per Claim 20, Kishi discloses, “further comprising means for blocking write access to the one or more storage classes for the duration of the operations” as [“the suspect physical tape volume is deemed “read-only” by the storage manager.” (Col 1, Lines 56-57)].

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 6-7, 17-18, 26-27, 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi (United States Patent 6,029,179) and further in view of Thomas et al. (hereinafter Thomas) (United States Patent 6,061,692).

As per Claim 6, 17, 26, and 37, Kishi discloses, "wherein the one or more storage classes that store data that is not modifiable by applications while the data is on those storage classes, and wherein, to perform the operation without using a split mirror of the one or more storage classes" as [**"the suspect physical tape volume is deemed "read-only" by the storage manager."** (Col 1, Lines 56-57) and **"The first step in read-only processing performed by the automated administrator 36 is to query the storage manager 30 for a list of all the logical volumes or files that the storage manager 30 has written to the physical volume at step 42."** (Col 5, Lines 19-22)], but fails to explicitly disclose "configured to be write locked" and "examine a write lock of each write-locked storage class to determine if the storage class could have been written to during the operation on that storage class; and if the storage class has been written to during the operation on the storage class, retry the operation for the storage class."

Thomas discloses, "configured to be write locked" as [**"The present invention implements two different types of read locks and two different types of write locks. In this discussion, the two different read locks will be referred to as a read lock and a path read lock, and the two different write locks will be referred to as a write lock and a path write lock."** (Col 22, Lines 50-54)] "examine a write lock of each write-locked storage class to determine if the storage class could have been written to during the operation on that storage class" [**Thomas discloses this limitation as "the process begins with a request for a read lock as indicated by step 278. Before a read lock will be granted, it will be checked to see if the key**

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location has any open write locks or path write locks.” (Col 24, Lines 18-21)] “if the storage class has been written to during the operation on the storage class, retry the operation for the storage class.” [Thomas discloses this limitation as “If the key location has active write locks or path write locks, execution then proceeds to step 282 where one of several events may occur. In the situation illustrated in FIG. 9A, the request waits until no write locks or path write locks remain on the desired key location. In the alternative, the routine may return with an error indicating that a read lock may not be granted. As yet a third option, the routing may wait for a designated period of time and, if the read lock cannot be granted within that time, return with an error.” (Col 24, Lines 22-31)].

Kishi and Thomas are analogous art because they are both from the same field of endeavor of hierarchical storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the system of Kishi to include the use of write locks and read locks on the ‘read-only’ storage designated by the storage system from Thomas. The motivation to combine is disclosed by Thomas as “Thus, opening a read lock on a particular location will block any write locks from being granted on that location. Similarly, if a location is being updated, then no entity should read the location until the update has been complete. Thus, a write lock on a particular location will block any read locks from being granted.” (Col 22, line 64 – Col 23, Line 3).

As per Claim 7, 18, 27, and 38, Kishi discloses, "The system as recited in claim 1 [14, 21, 32]" as **[See rejection to Claim 1 [14, 21, 32] above]**, but fails to explicitly disclose, "wherein the application is further configured to block the file system software from enabling the write-locked storage class for writing for the duration of the operation."

Thomas discloses, "wherein the application is further configured to block the file system software from enabling the write-locked storage class for writing for the duration of the operation" as **["Thus, opening a read lock on a particular location will block any write locks from being granted on that location. Similarly, if a location is being updated, then no entity should read the location until the update has been complete. Thus, a write lock on a particular location will block any read locks from being granted." (Col 22, line 64 – Col 23, Line 3)]**.

Kishi and Thomas are analogous art because they are both from the same field of endeavor of hierarchical storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the system of Kishi to include the use of write locks and read locks on the 'read-only' storage designated by the storage system from Thomas. The motivation to combine is disclosed by Thomas as "In general, a read lock and write lock function in much the same way as has been traditionally employed in other contexts. For example, if an entity wishes to ensure that no data will be changed while it is reading a key it may open a particular key location for reading." (Col 22, Lines 55-59).

CLOSING COMMENTS

Conclusion

STATUS OF CLAIMS IN THE APPLICATION

12. The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. 707.07(i)**:

CLAIMS REJECTED IN THE APPLICATION

13. Per the instant office action, **Claims 1-42** have received a first action on the merits and are subject of a first action non-final.

14. The examiner requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and line no(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

15. When responding to this office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present, in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections See 37 CFR 1.111(c).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth M. Lo whose telephone number is 571-272-9774. The examiner can normally be reached on Mon - Thu (7:30am - 6:00pm).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung Sub (Sam) Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

04/11/07

Kenneth Lo
Art Unit: 2188

Kevin L. Ellis
Primary Examiner

Kevin L. Ellis
4/12/07